

WHAT IS CLAIMED IS:

1. A process for making a polymer dispersion, comprising
 - (a) forming a mixture of an isocyanate-terminated prepolymer substantially devoid of acid or ionic groups and at least one monomer having at least one site of polymerizable carbon-carbon unsaturation and which is liquid or solid at room temperature, the prepolymer being soluble in the monomer(s) at the relative proportions that are present;
 - (b) dispersing the mixture into an aqueous phase under conditions sufficient to form an aqueous dispersion of a plurality of stabilized droplets that have an average diameter of no greater than about 1000 nm and contain both the prepolymer and the monomer(s), and
 - (c) subjecting the dispersion from step (b) to conditions sufficient to polymerize the monomer(s) and chain-extend said prepolymer in a single step to form a plurality of hybrid polymer/polyurethane particles having an average diameter of no greater than about 1000 nm dispersed in said aqueous phase.
2. The process of claim 1 wherein the aqueous phase contains water and at least one external surfactant.
3. The process of claim 2, wherein the isocyanate-terminated prepolymer contains from about 1.8 to about 4 isocyanate groups/molecule and has a weight per isocyanate group of about 500 to about 3000 daltons.
4. The process of claim 3, wherein the monomer(s) has a solubility in water at 25°C of less than 2 grams/liter.
5. The process of claim 4 wherein the mixture of prepolymer and monomer has a viscosity of no greater than 1000 cps (1 Pa•s) at 25°C.
6. The process of claim 5 wherein the prepolymer is water-dispersible.
7. The process of claim 6, wherein the prepolymer is the reaction product of a polyisocyanate and a polymer of propylene oxide and/or ethylene oxide.

8. The process of claim 5 wherein the droplets have an average diameter of no greater than about 300 nm.
- 5 9. The process of claim 8 wherein the prepolymer is chain-extended with water.
- 10 10. The process of claim 8 wherein the prepolymer is chain-extended with water and a water-soluble auxiliary chain extender.
- 11 11. The process of claim 5 wherein a costabilizer having a solubility in water of less than 10^{-5} g/liter is used.
- 15 12. The process of claim 8 wherein the surfactant is a mixture of an anionic and nonionic surfactants.
13. The process of claim 8 wherein fewer than 10 volume percent of the polymer particles are substantially devoid of polyurethane.
- 20 14. The process of claim 1, further comprising the step of, after step (b) and before step (c), dissolving a gaseous monomer into the aqueous dispersion under conditions such that the gaseous monomer diffuses to the stabilized droplets.
- 25 15. The process of claim 14, wherein the gaseous monomer is butadiene and the liquid or solid monomer comprises styrene.
16. A dispersion of polymer particles prepared in the process of claim 1.
17. A dispersion of polymer particles prepared in the process of claim 5.
- 30 18. A dispersion of polymer particles prepared in the process of claim 14.
19. A dispersion of polymer particles in a continuous aqueous phase, wherein the polymer particles are hybrid particles of a polyurethane and a polymer of a

monomer having at least one site of polymerizable carbon-carbon unsaturation, further characterized in that the polymer particles have an average diameter of less than about 1000 nm and exhibit a core-shell morphology on transmission electron spectroscopy, in which the particles have a core portion rich in the
5 polymer and a shell portion that is rich in the polyurethane.

20. The dispersion of claim 19 wherein the monomer includes an acrylic ester.

21. A film made by coagulating or drying the dispersion of claim 19.

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22. A film made by coagulating or drying the dispersion of claim 16.

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